REMARKS

On entry of this Response, claim 24 is amended to recite a wet acid etchant comprising water. New claims 32-34 are also added. Support for the amendment and new claims can be found, for example, in the originally-filed application at page 6, lines 5-25 and page 7, line 13 through page 8, line 2. No new matter is added.

Claims 1-23 were withdrawn in response to the Examiner's restriction requirement. Amongst remaining claims 24-31, claim 24 is independent. Applicants respectfully submit that claims 24-31 define over the prior art of record.

I. Claim Rejection under 35 U.S.C. §112, First Paragraph

In the Office Action, the Examiner rejects claims 26-30 under 35 U.S.C. §112, first paragraph, failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants believe the Examiner means to reject claims 26-31, as claim 31 is also discussed in the §112 rejection.

More specifically, the Examiner notes that claims 26 and 29-31 recite "the etched material," but there does not appear to be antecedent basis for this claim term. Applicants amend independent claim 24, from which claims 26-31 depend, to recite "a wet acid etchant for wet acid etching of a portion of the $Al_{1-x-z}Ga_xIn_zAs_{1-y}Sb_y$ material to form an etched material." Applicants believe that this amendment addresses the Examiner's concerns.

For at least the reasons set forth above, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 26-31 under 35 U.S.C. §112, first paragraph.

II. Claim Rejection under 35 U.S.C. §103(a)

A. Rejections in view of Mishurnyi and Boos

Claims 24 and 26-31 stand rejected under 35 U.S.C. §103(a) as being obvious over Mishurnyi *et al.* ("Multicomponent Sb-based solid solutions grown from Sb-rich liquid phases") in view of U.S. Patent No. 5,798,540 ("Boos"). Applicants respectfully traverse this rejection in view of the amended claims.

Amended independent claim 24 recites:

24. A system for preparing a semiconductor structure, the system comprising;
an $Al_{1-x-z}Ga_xIn_zAs_{1-y}Sb_y$ material with $0<x<1$, $0<y<1$, $0<z<1$ and $0<x+z<1$; and
a wet acid etchant for wet acid etching of a portion of the $Al_{1-x-z}Ga_xIn_zAs_{1-y}Sb_y$ material to form an etched material, the wet acid etchant comprising:
a) organic acid;
b) oxidizing agent;
c) hydrofluoric acid; and
d) water.

Claim 24 is rejected on the basis of prior disclosed information by V.A.Mishurnyi et al. which shows that the material AlGaAsSb and AlGaInAsSb has previously been manufactured through epitaxial deposition. The presently claimed invention does not cover the manufacturing of AlGaAsSb or AlGaInAsSb epitaxial layers, but of a semiconductor structure prepared by wet etching of these layers. At the time of the invention, there was no existing etchant known to etch AlGaAsSb or AlGaInAsSb with a resulting smooth surface for semiconductor use, although a number of acids were known to attack these materials.

Indeed, the Examiner recognizes that Mishurnyi does not etch the AlGaInAsSb material (Office Action at page 3). Instead, the Examiner relies on Boos for etching and a particular etchant.

In order for a number of devices to be manufacturable, the acid solution must etch the corresponding material so that a controlled structure can be made. Boos et al. shows etching for InAlAsSb (without Ga), for AlSb and for GaSb using concentrated solutions of the mentioned acids (see Boos at Abstract). In contrast, the presently claimed solution uses diluted acids to carry out the etching and formation of structures in AlGaInAsSb or AlGaAsSb, which balances the etch and forms smooth surfaces.

Accordingly, in order to expedite prosecution, Applicants amend claim 24 to recite:

" A semiconductor structure prepared by.... ...with a wet acid etchant comprising:
a) organic acid;
b) oxidizing agent;
c) hydrofluoric acid; and
d) water."

Applicants respectfully submit that Boos does not disclose or suggest the use of a wet acid etchant comprising water. Indeed, Boos specifically teaches the use of a concentrated acid composition.

For the reasons set forth above, Applicants respectfully submit that Mishurnyi and Boos, alone or in any reasonable combination, do not disclose or suggest each and every element of amended claim 24. Claims 26-31 depend from claim 24 and, as such, incorporate all of the features recited in claim 24. Therefore, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 24 and 26-31 under 35 U.S.C. §103(a).

B. Rejections in view of Mishurnyi, Boos, and Garbuzov

Claim 25 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Mishurnyi *et al.* or Mishurnyi *et al.* in view of Boos *et al.*, and further in view of Garbuzov *et al.* ("2.3-2.7-μm Room Temperature CW Operation of InGaAsSb-AlGaAsSb Broad Waveguide SCH-QW Diode Lasers"). See Office Action, page 5. Applicants respectfully traverse this rejection in view of the amended claims.

Claim 25 depends from claim 24 and, as such, incorporates all of the features recited in claim 24. Applicants respectfully submit that Mishurnyi *et al.*, Boos *et al.* and Garbuzov *et al.*, alone or in any reasonable combination, do not teach or suggest "a wet acid etchant for wet acid etching of a portion of the $Al_{1-x-z}Ga_xIn_zAs_{1-y}Sb_y$ material ... the wet acid etchant comprising: a) organic acid; b) oxidizing agent; c) hydrofluoric acid; and d) water," as recited in claim 25.

As discussed above, Mishurnyi *et al.* and Boos *et al.* do not teach or suggest the above feature.

Garbuzov *et al.* is cited by the Examiner to provide teachings for the feature added in claim 25. Garbuzov *et al.*, however, does not teach or suggest "a wet acid etchant ... comprising: a) organic acid; b) oxidizing agent; c) hydrofluoric acid; and d) water" as recited in claim 25. Although Garbuzov *et al.* is combined with Mishurnyi *et al.* and Boos *et al.*, the combination does not teach or suggest the above feature.

For the reasons set forth above, Applicants respectfully submit that Mishurnyi *et al.*, Boos *et al.* and Garbuzov *et al.*, alone or in any reasonable combination, do not teach or suggest

all of the limitations of claim 25. Therefore, Applicants respectfully request that the Examiner reconsider and withdraw the above rejection of claim 25.

V. Rejection of Claims 26-31 under 35 U.S.C. §103(a)

Claims 26-31 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Mishurnyi *et al.* or Mishurnyi *et al.* in view of Boos *et al.*, and further in view of Deryagin *et al.* ("High Quality AlGaSb, AlGaAsAb and InGaAsSb epitaxial layers grown by liquid-phase epitaxy from Sb-rich melts"). Applicants respectfully traverse this rejection in view of the amended claims.

Claim 26-31 depend from amended claim 24 and, as such, incorporate all of the features recited in amended claim 24. Applicants respectfully submit that Mishurnyi *et al.*, Boos *et al.* and Deryagin *et al.*, alone or in any reasonable combination, do not teach or suggest "a wet acid etchant for wet acid etching of a portion of the $Al_{1-x-z}Ga_xIn_zAs_{1-y}Sb_y$ material ... the wet acid etchant comprising: a) organic acid; b) oxidizing agent; c) hydrofluoric acid; and d) water," as recited in claims 26-31.

As discussed above, Mishurnyi *et al.* and Boos *et al.* do not teach or suggest the above feature.

Deryagin *et al.* is cited by the Examiner to provide teachings for the feature added in claims 26-31. Deryagin *et al.*, however, does not teach or suggest "a wet acid etchant comprising: a) organic acid; b) oxidizing agent; c) hydrofluoric acid; and d) water," as recited in claim 25. Although Deryagin *et al.* is combined with Mishurnyi *et al.* and Boos *et al.*, the combination does not teach or suggest the above feature.

For the reasons set forth above, Applicants respectfully submit that Mishurnyi *et al.*, Boos *et al.* and Deryagin *et al.*, alone or in any reasonable combination, do not teach or suggest all of the limitations of claims 26-31. Therefore, Applicants respectfully request that the Examiner reconsider and withdraw the rejection of claims 26-31 under 35 U.S.C. §103(a).

III. New Claims 32-34

Applicants respectfully submit that new claims 32-34, which depend from claim 24, recite

further patentable subject matter. New claims 32-34 recite specific ranges of values for the amount of each component of the wet acid etchant. For example, claim 34 recites that *the wet acid etchant comprises up to 60 wt-% of organic acid, up to 15 wt-% of oxidizing agent, and up to 10 wt-% of hydrofluoric acid.* Applicants respectfully submit that the cited references do not disclose or suggest the specific ranges described in claims 32-34.

In view of the above, Applicants respectfully request that new claims 32-34 be passed to allowance.

CONCLUSION

In view of the above comments, Applicants believe that the pending application is in condition for allowance and urges the Examiner to pass the claims to allowance. Should the Examiner feel that a teleconference would expedite the prosecution of this application, the Examiner is urged to contact the Applicant's attorney at (617) 227-7400.

Please charge any shortage or credit any overpayment of fees to our Deposit Account No. 12-0080, under Order No. BRW-002USRCE. In the event that a petition for an extension of time is required to be submitted herewith, and the requisite petition does not accompany this response, the undersigned hereby petitions under 37 C.F.R. §1.136(a) for an extension of time for as many months as are required to render this submission timely. Any fee due is authorized to be charged to the aforementioned Deposit Account.

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